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ABSTRACT

Realizing the importance of writing skills in communicating with other professionals and in educating the public, scientists and scientific institutions have renewed their interest in the writing education of science students. Informal surveys show that technological and engineering schools are reinstituting writing requirements and staffing the classes, in part, with scientists or engineers. Besides cooperative teaching, the direct involvement of the scientific community in writing skills development also includes science faculty efforts to single out students with writing problems and refer them to special writing clinics. In addition, more technological institutions are teaching science writing for general audiences, as evidenced by a 1977 directory of such courses and programs. Professional societies are also supplementing the universities' efforts with programs of their own designed to improve the willingness and ability of their members to communicate with the public. What remains for scientists and science educators to do is to help journalism students, especially those interested in science journalism, to learn about science, thereby increasing their ability to write about it. Scientists can do this by assisting in course development, being available as resource persons to such classes, and encouraging greater interaction between the journalism students and the science community. (RL)

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SHOULD SCIENTISTS BE INVOLVED IN TEACHING SCIENCE WRITING -- AND IF SO, HOW?

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By most accounts, scientists and writing, like oil and water, just do not mix. Hillier Krieghbaum (13), building on C.P. Snow's analysis (17), has described in detail the tensions between scientists and journalists, observing that "at least two varying points of view have clashed in naked conflict when scientists and physicians have met newsmen." Lately, adding injury to insult, the ponderous jargon and passive style of technical discourse seem to be causing deterioration in the rest of the language, inflicting diseases like what Jacques Barzun (3) calls the "noun plague."

Stephen Jay Gould (10), a Harvard University biologist who writes a column for Natural History magazine, offers at least three reasons why scientists do not write well. First, there is a preselection process: people who write well simply do not become scientists. Second, good writing is not rewarded within the scientific community's set of values. And third, scientists view themselves as belonging to a special priesthood, set apart from other activities. Consequently, popular writing is seen by scientists as a waste of time, a risk to reputation, Gould says. And indeed sociologists have described a powerful system of social control

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within science that recognizes and rewards basic research and discourages peripheral activities (18).

Yet, ever since scientists evolved into a professional community in the nineteenth century, there have also been pressures upon them to popularize science, to justify social and financial support for research (19). Among many scientists, too, there is an evangelistic zeal, a desire to share with the lay public the joys and mysteries of research (12). Others feel they have special expertise to impart to the public in dealing with technological issues (15). Popularization enjoyed relative acceptance among scientists for several years after World War I, and again after World War II. Now again, with Congressional budgets shrinking or uncertain, there is a movement toward social responsibility and public communication (4). For these and other reasons, scientists have been playing an increasingly important role in the doing and the teaching of writing.

Scientists and the Spectrum of Science Writing

Scientists and engineers are of course primarily concerned with the kind of writing -- called, logically enough, "scientific and engineering writing" -- that reaches their fellow professionals, in journal articles, symposium papers, memoranda, and the like. Managers, editors, and others within government agencies and technological industry concentrate on writing -- called "technical writing" -- that communicates information from the scientific and engineering professions to the personnel that need the information to carry out their jobs, for example in instruction manuals, environmental impact statements, and project reports.

And journalism professionals do the lion's share of writing -- "science writing," "medical writing," "environmental writing" -- that communicates information via the mass media from the technical professions to unspecialized audiences.

The variety of writing about science can be usefully viewed arranged along a continuum of audiences, as William Paisley (14) has outlined. Recipients of science information are ordered on the continuum according to their previous knowledge of the technical area being communicated, such that scientists in the communicator's own research specialty are at one end, the general publics at the other. Building on the continuum concept, a number of additional categories of audience can be identified, such as management in technical industry, consumer groups, and policy makers. (See Figure 1.) In this scheme, scientific and engineering writing cover one end of the continuum, technical writing the middle, and science writing the opposite end.

It is clear that scientists and engineers participate extensively in writing activities at the specialized end of the scale. Their participation decreases as audiences become less specialized, and the role of professional writers increases. There are nonetheless a number of scientists engaged in popular writing; Stephen Jay Gould, whose columns were recently compiled in Ever Since Darwin (9), is an example, as are Margaret Mead, Carl Sagan, Lewis Thomas, and many others. And increasingly, too, at the opposite end of the scale, there are professional editors and scientific writers engaged in specialized scientific and engineering communication, compiling reports, drafting proposals, and preparing journal articles within university research groups, consulting companies, and industry.

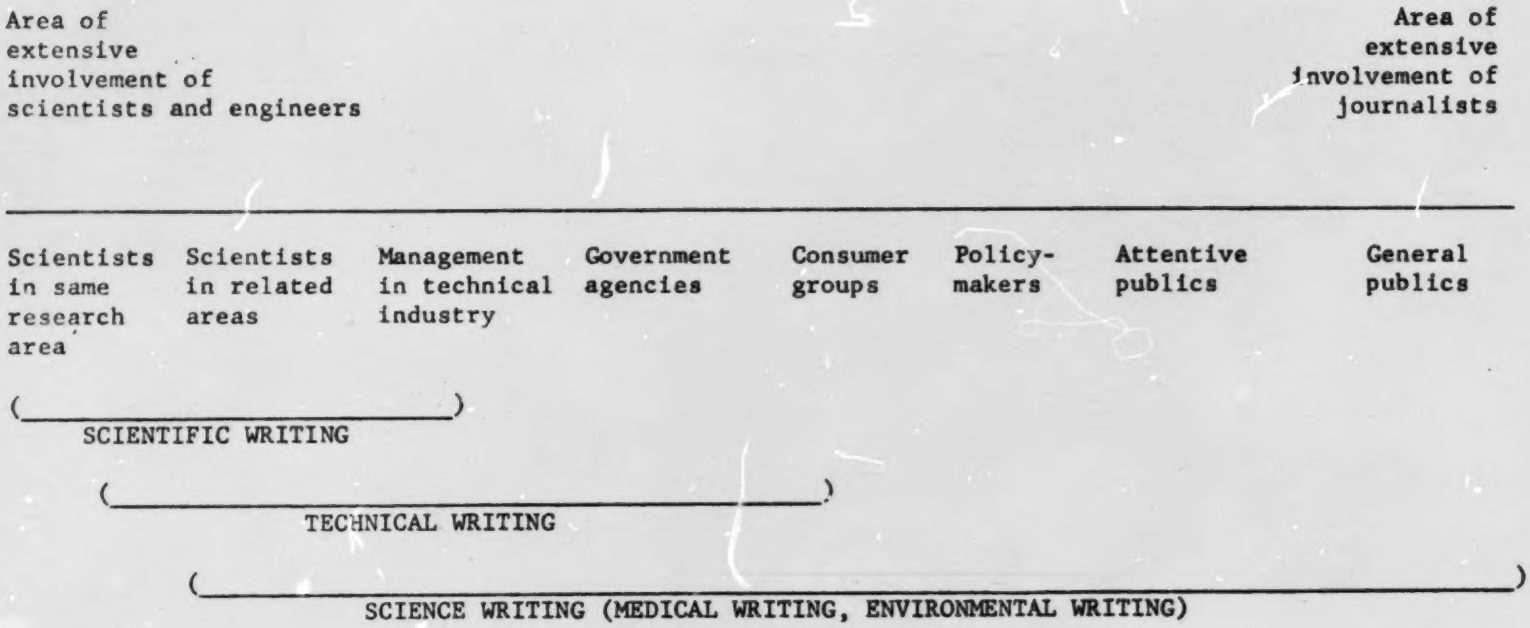

Figure 1. Audience Continuum

Scientists and the Teaching of Writing

At least until recently, the participation of scientists in the teaching of writing was considerably more limited than in writing itself. In the age of specialization, the "priesthood" had better things to do than attempt to teach writing. But a renewed interest nationally in writing skills has led to several developments.

a. Scientific and engineering writing

First, in the area of scientific and engineering writing, experiments are underway to incorporate writing training within technical curricula. In an informal survey of leading technological institutions and engineering schools in 1976, Massachusetts Institute of Technology (8) found a trend toward reinstituting writing requirements. Although responsibility for the new writing courses continues to rest primarily with English departments and writing programs, several new plans call for more direct involvement of engineering and science faculty. At Case-Western Reserve University and Illinois Institute of Technology, all faculty members are asked to single out students in their classes with writing problems and refer them to special writing clinics. At Case the clinic is part of a "university competence requirement;" at IIT attendance is voluntary. At University of Michigan and University of Virginia Schools of Engineering, the Humanities Department requires seminars in communication for seniors rather than for freshmen, on the grounds that the older students are better motivated to learn communication skills.

Cooperative teaching, in which writing faculty offer a module of instruction within engineering courses, is also being instituted in a number of technical schools, including Carnegie Institute of Technology (part of Carnegie-Mellon University), Case-Western Reserve University, and Massachusetts Institute of Technology. At M.I.T., the School of Engineering first offered financial assistance for cooperative writing instruction in 1977-78, and the program is now expanding rapidly within several engineering departments, in graduate as well as undergraduate classes. In general, the writing teacher lectures on oral and written communication during a few class hours, then critiques students' oral and written reports and confers with the engineering instructor on grading.

Several technical schools including M.I.T. are also experimenting with special seminars, offered by writing instructors to train science and engineering faculty or teaching assistants to teach writing to their students.

b. Science Writing

Technological institutions are also taking initiative in teaching science writing, oriented toward general audiences. In 1977 a directory (7) was compiled listing courses and programs concerned with communication of science and technology to the public. Included were courses and programs in science writing, environmental communication, health and medical communication, and agricultural journalism, and also those in technical communication that contained material on communicating with nonspecialized audiences. The most striking feature of the Directory was the extensive participation

of science, engineering, and environmental schools and departments.

Of the 15 institutions in the Directory offering graduate or undergraduate science or environmental communication programs, 6, or more than one-third, are housed in schools of science, medicine, or natural resources. For example, Texas Tech University School of Medicine has a master's program in health communications, University of Michigan School of Natural Resources an M.S. and a Ph.D. in environmental communications, and M.I.T. School of Science an M.S. in science communication. Of 35 institutions offering science and environmental writing courses, 11 -- again almost one-third -- offer them within schools or departments of science, engineering, or natural resources.

Increasingly, too, science students are taking the science writing courses offered in journalism and English departments. Of the 105 courses listed in all, about half include science, medical, engineering, or environmental students, and one-fourth are only for science students. Of the 45 traditional science writing courses, 36, or 80%, are taught in journalism departments, but 10 of the 36 have science majors enrolled. As an example of the trend, a year ago M.I.T., with funding from the DeWitt Wallace Fund, Inc., instituted a series of undergraduate courses specifically to improve the writing skills of its science and engineering students, and to sensitize students to the need for communication with the public. The program attracts both students planning journalistic careers and those who feel effective popular writing will be important in their science or engineering careers.

The scientific, engineering, and medical professional societies are supplementing the universities' efforts with programs of their own,

designed to improve the willingness and ability of members to communicate with the public. The American Association for the Advancement of Science, for instance, holds at least one session on an aspect of science communication each year at its annual meeting (2). In January and February 1979, the annual joint meeting of the American Association of Physics Teachers and the American Physical Society will include a session on scientists and the public, focusing on ways to encourage public participation from physicists. The Federation of American Societies for Experimental Biology a few years ago had an extensive session on the relationship of scientists and science writers (11). Probably the professional societies' most direct commitment to science writing education is the AAAS's Mass Media Intern Program, held each summer since 1975 for training advanced (usually graduate) students from the natural and social sciences.

Teaching Science to Writers

Scientists and scientific institutions, then, have recently been taking a renewed interest in the writing education of science students. There is a growing recognition among scientists that writing skills are an important asset in technical careers, both in communicating with fellow professionals and in educating the public.

The same forces, however, that make it important for science students to learn how to write also make it important for journalism students to learn science, particularly those students with an interest in science journalism. As science and technology become more sophisticated, science writers must develop more sophisticated backgrounds. Increasingly, too, jobs for science writers are in more specialized areas, not at general

magazines and newspapers, and employers are looking for solid science education as well as communication skills. Although in the past journalists have downgraded formal science education (5), in two recent surveys science writers recommended more science training for future science writers (6,16). The National Association of Science Writers has been exploring with universities the possibility of regular seminars for local journalists on scientific topics (1).

Within journalism classes, scientists can assist in teaching science writing in several ways. First, of course, science faculty can advise on appropriate technical courses for journalism students, and even devise special ones; the Kent State University Department of Physics offers a course called "Physics for Journalism" (7). Second, scientists can be interviewed in class and outside of class for writing exercises. Third, students can attend and "cover" scientific seminars and meetings on campus as practice exercises. Fourth, scientists as guests in journalism classes can provide feedback on the accuracy and fairness of student or professional science writing. Fifth, the writing of gifted scientists like Lewis Thomas, Carl Sagan, or Canadian geneticist David Suzuki can be used as models for class discussion. Sixth, science students enrolled in journalism classes can be encouraged to contribute ideas on topics, sources, and accuracy of science writing. Seventh, students can attend local meetings of professional societies, and, with travel funding, national meetings as well. Students from M.I.T., Lehigh University, and Suffolk University traveled to the AAAS meeting in Washington, D.C. in February 1978, and found they acquired valuable experience both about science and about science reporting. The AAAS

Office of Membership Recruitment and Public Information made available to the students all the resources normally provided to the working press.

In short, promising developments within scientific institutions are improving the writing education of science students. Perhaps the greater need now is to tap the available resources within the scientific community for improving the science education of journalism students.

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